

# InSight

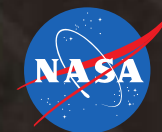
(Interior Exploration Using Seismic Investigations,  
Geodesy and Heat Transport)



## Into the History and Evolution of Our Solar System

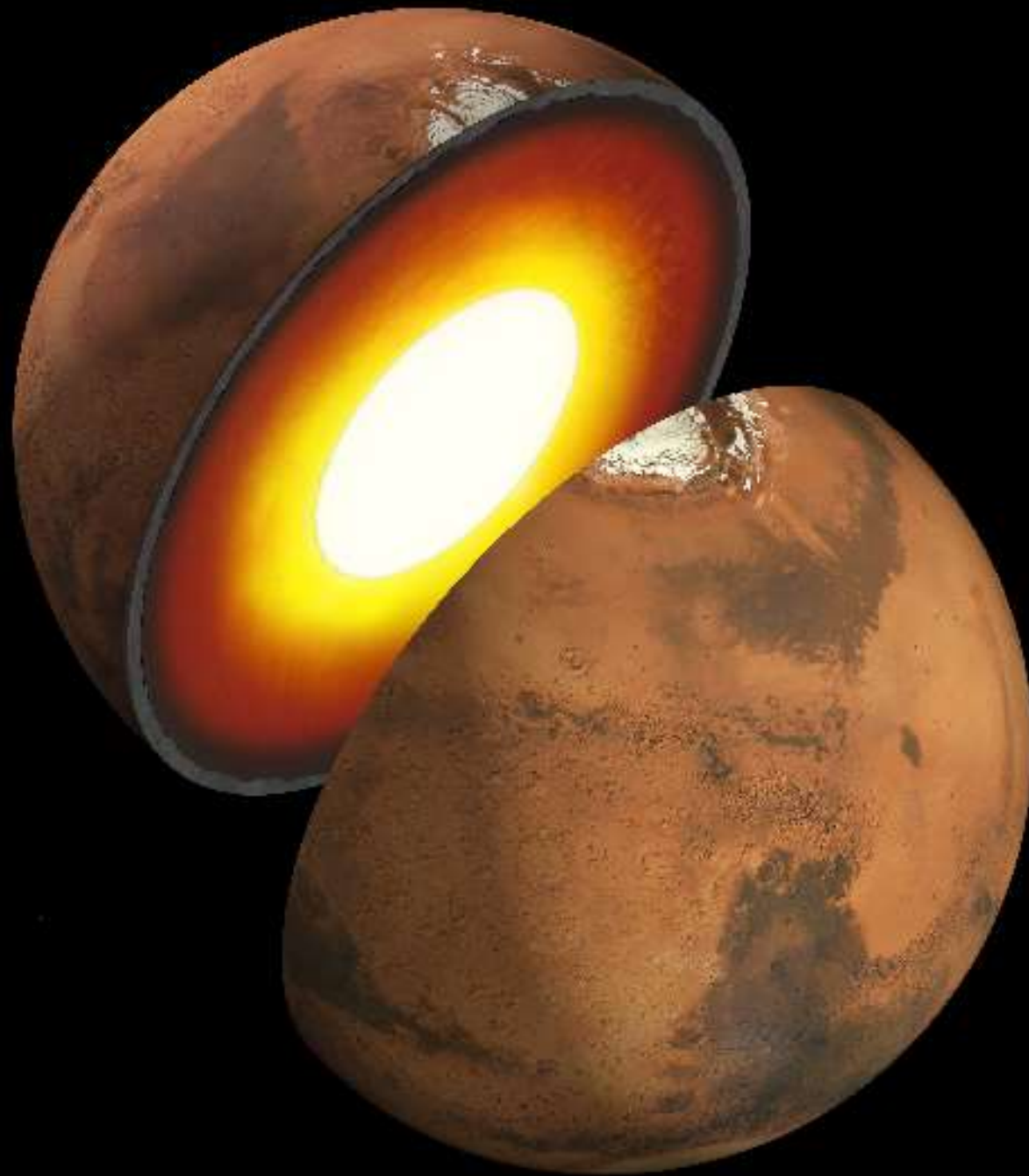
Bruce Banerdt – Principal Investigator

Tom Hoffman – Project Manager



Jet Propulsion Laboratory  
California Institute of Technology

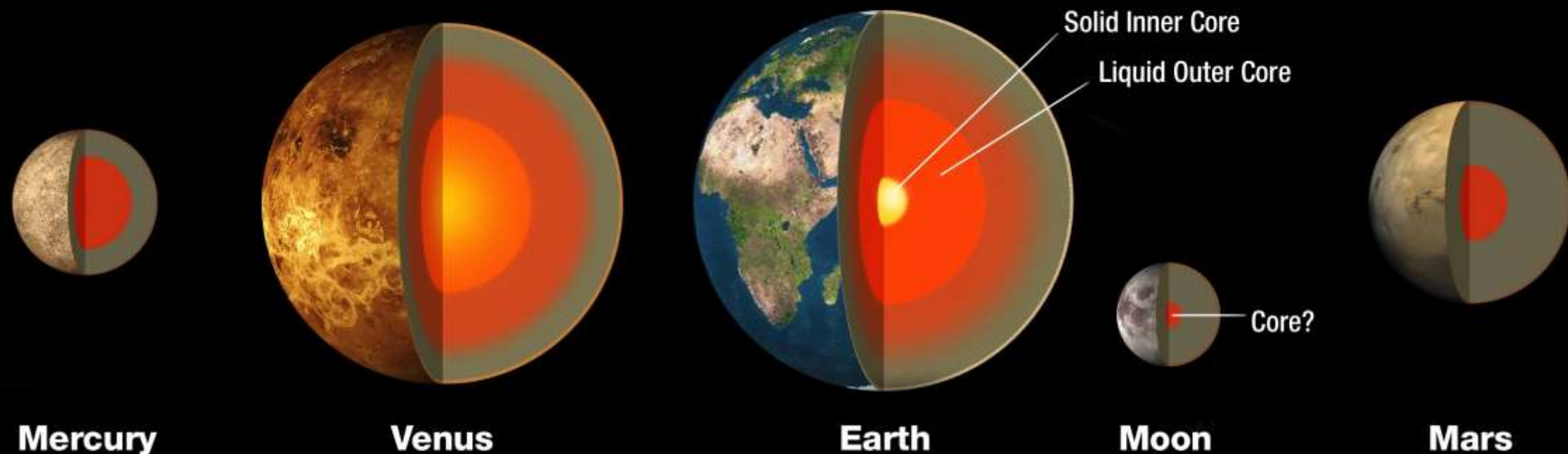
# The InSight Mission Goal



- The overall goal for InSight is to understand the formation and evolution of terrestrial planets through investigation of the interior structure and processes of Mars.
- This will help us understand the origin and diversity of terrestrial planets, and particularly how the evolution of terrestrial planets enables and limits the origin and evolution of life.



# Terrestrial Planet Interiors

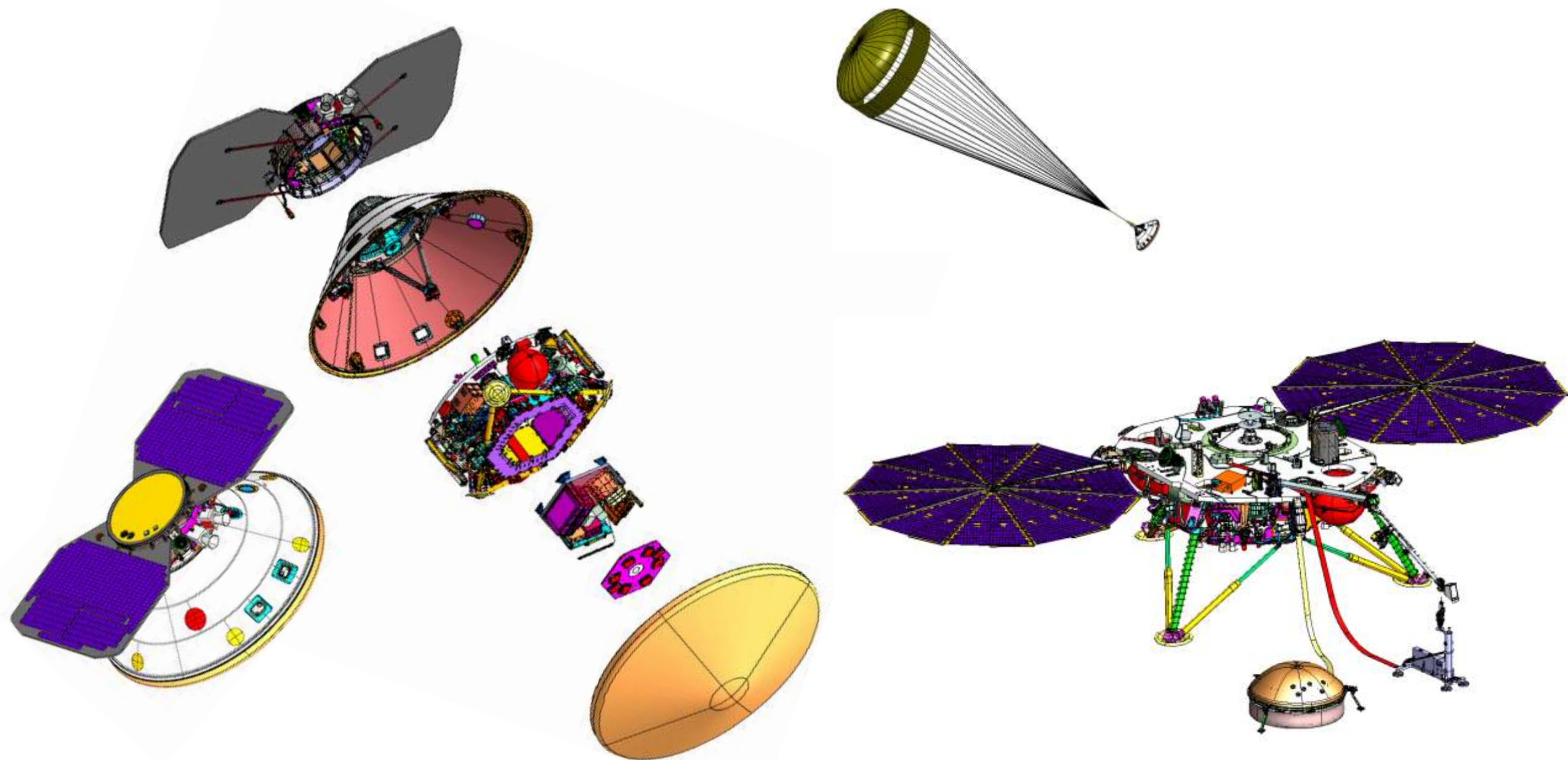


Terrestrial (or rocky) planets all share similar structures: a metallic core, surrounded by a dense silicate mantle, topped by a lighter, rocky crust.

- Although the bulk composition of a planet is similar to meteorites, it is far from uniform and *\*none\** of the rocks today are like the meteorites from which the planet originally formed.
- The planets reached their current overall structure through a process known as differentiation.
- This is a complicated process and is poorly understood.

# Phoenix Heritage Spacecraft

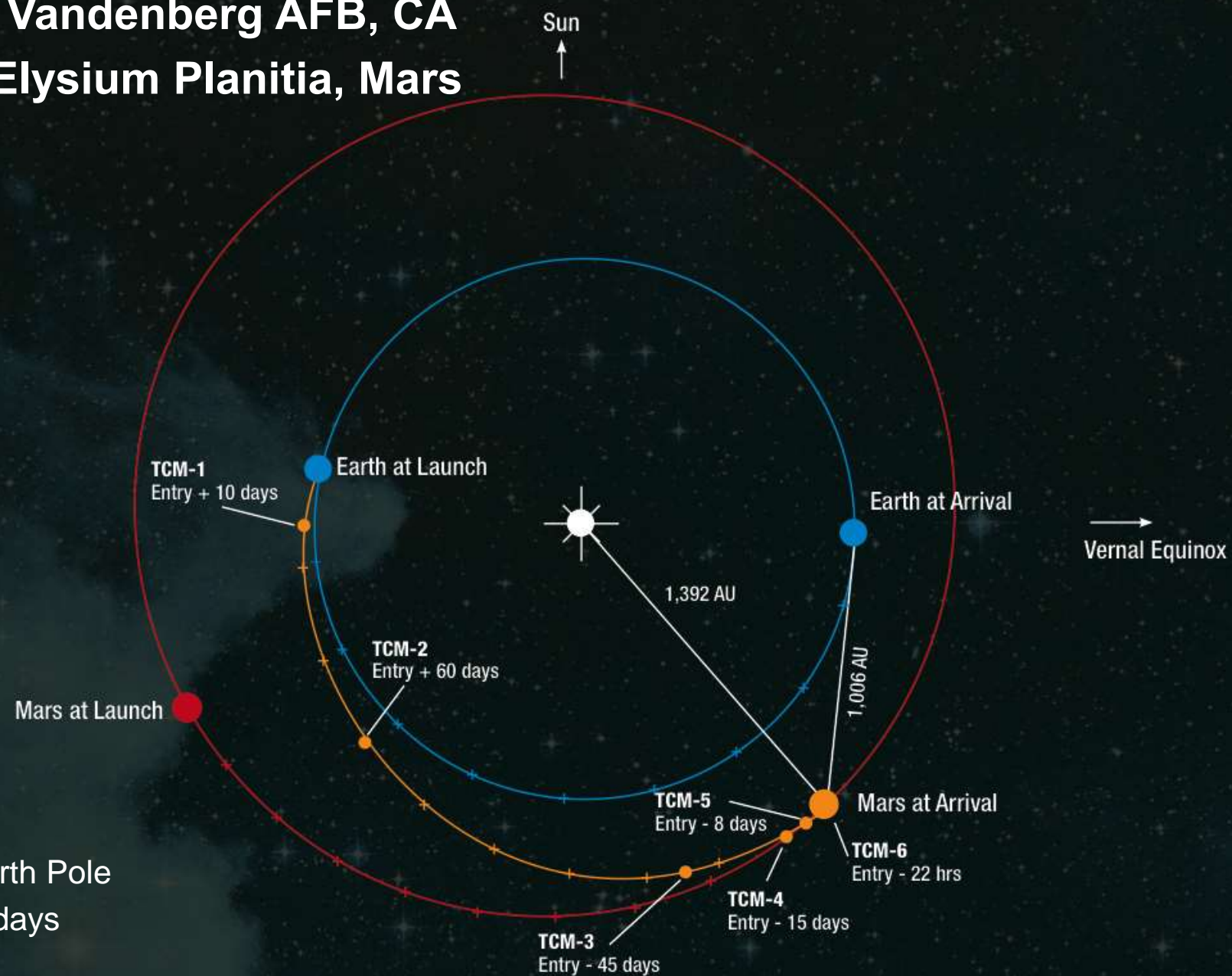
InSight will fly a near-copy of the successful Phoenix Flight System





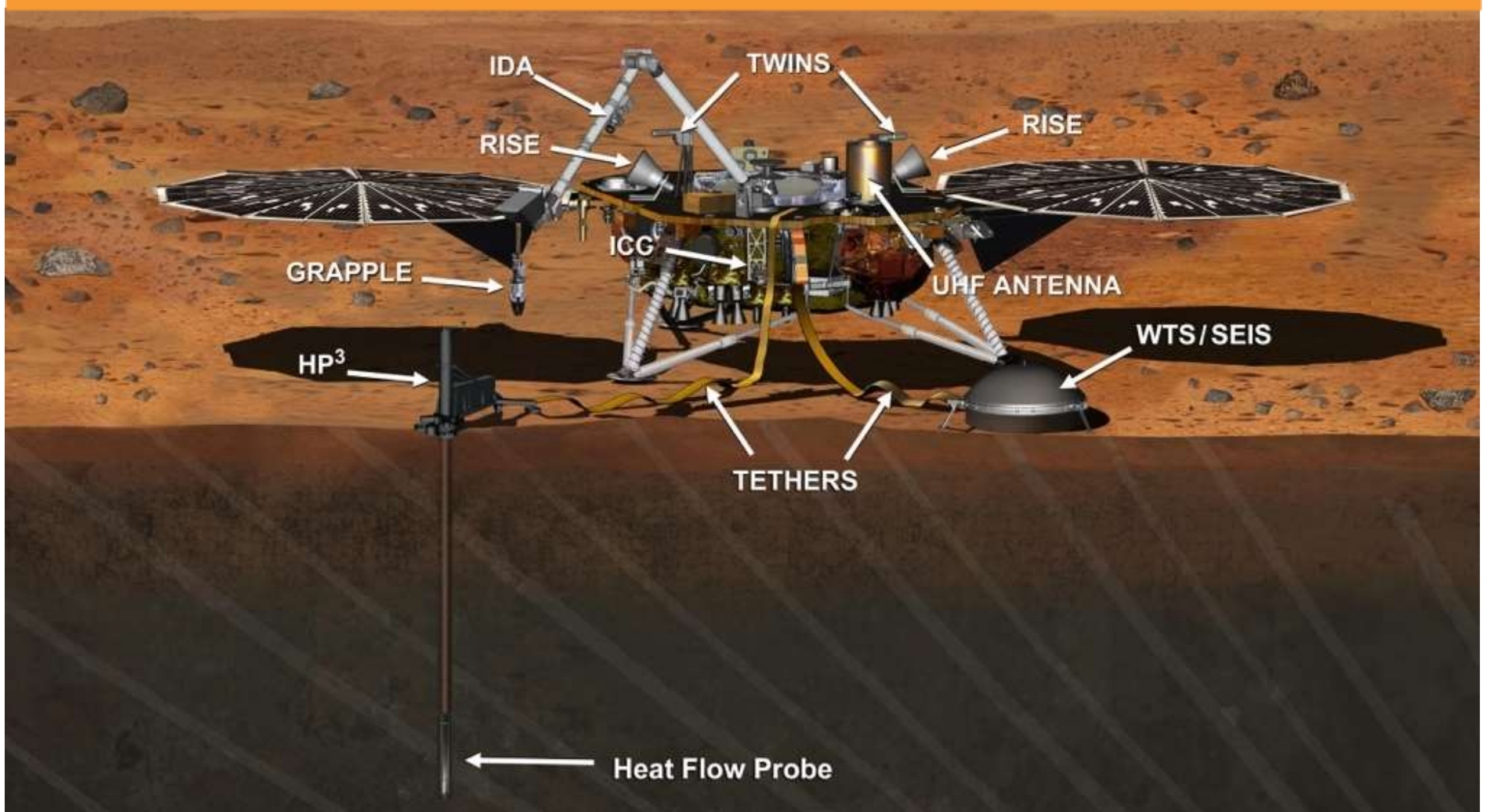
# Launch and Arrival

Launch 03/2016 – Vandenberg AFB, CA  
Arrival 09/2016 – Elysium Planitia, Mars





# InSight Payload

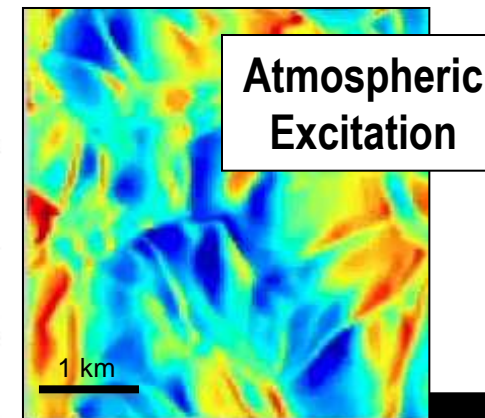
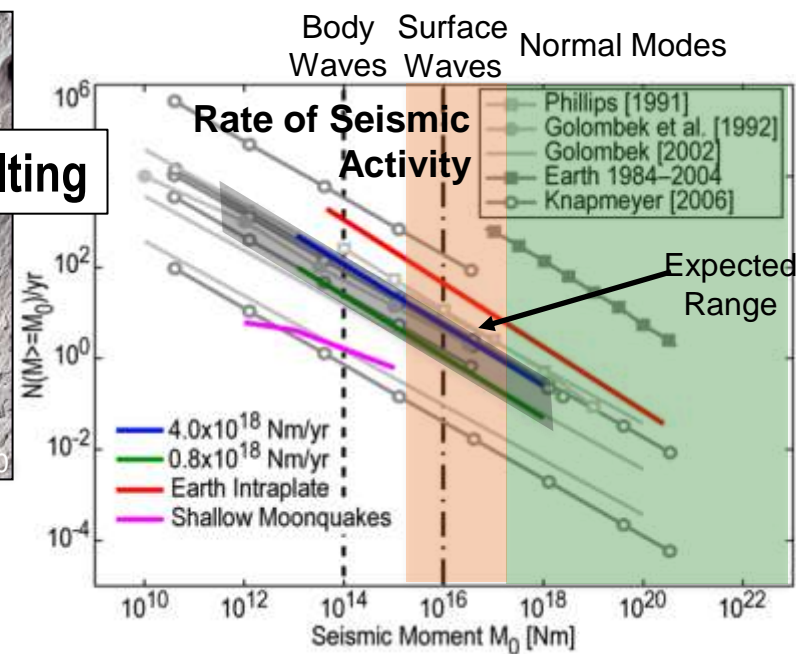




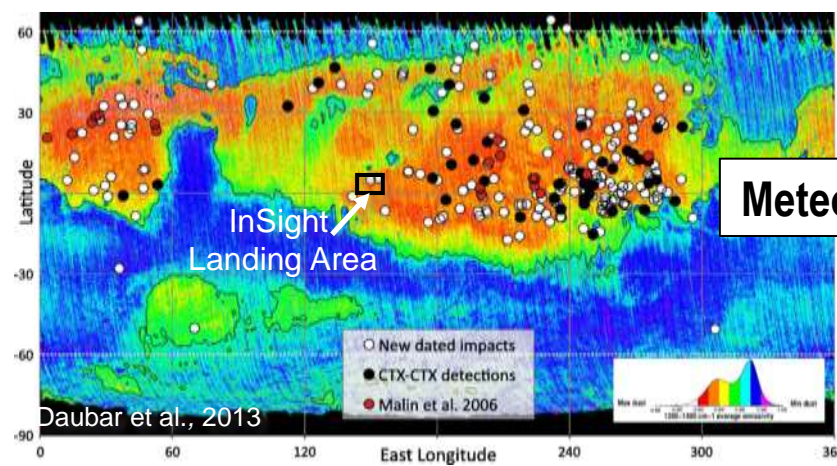
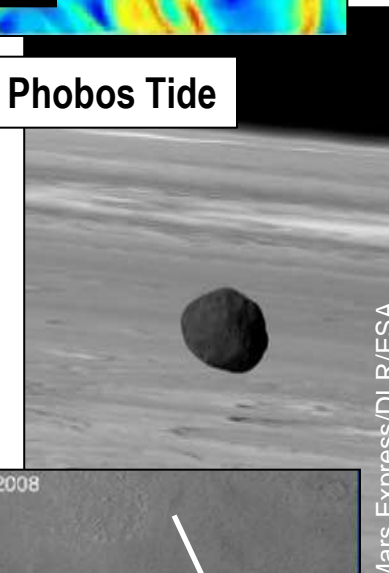
# Multiple Seismic Sources



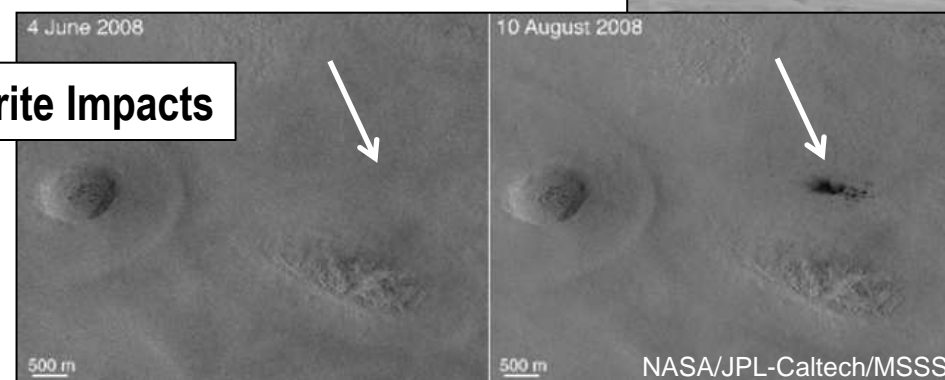
**Faulting**



**Phobos Tide**

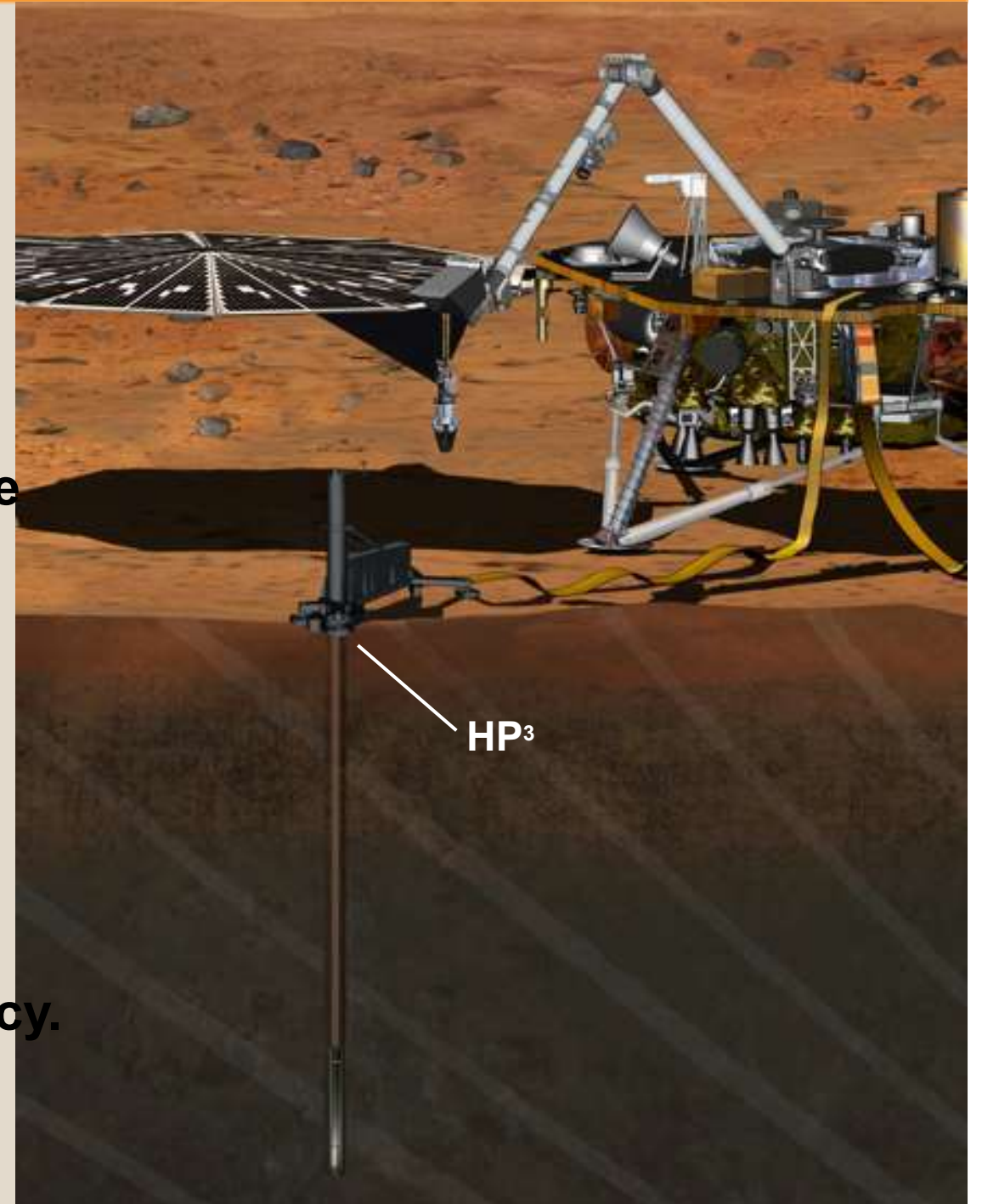


**Meteorite Impacts**



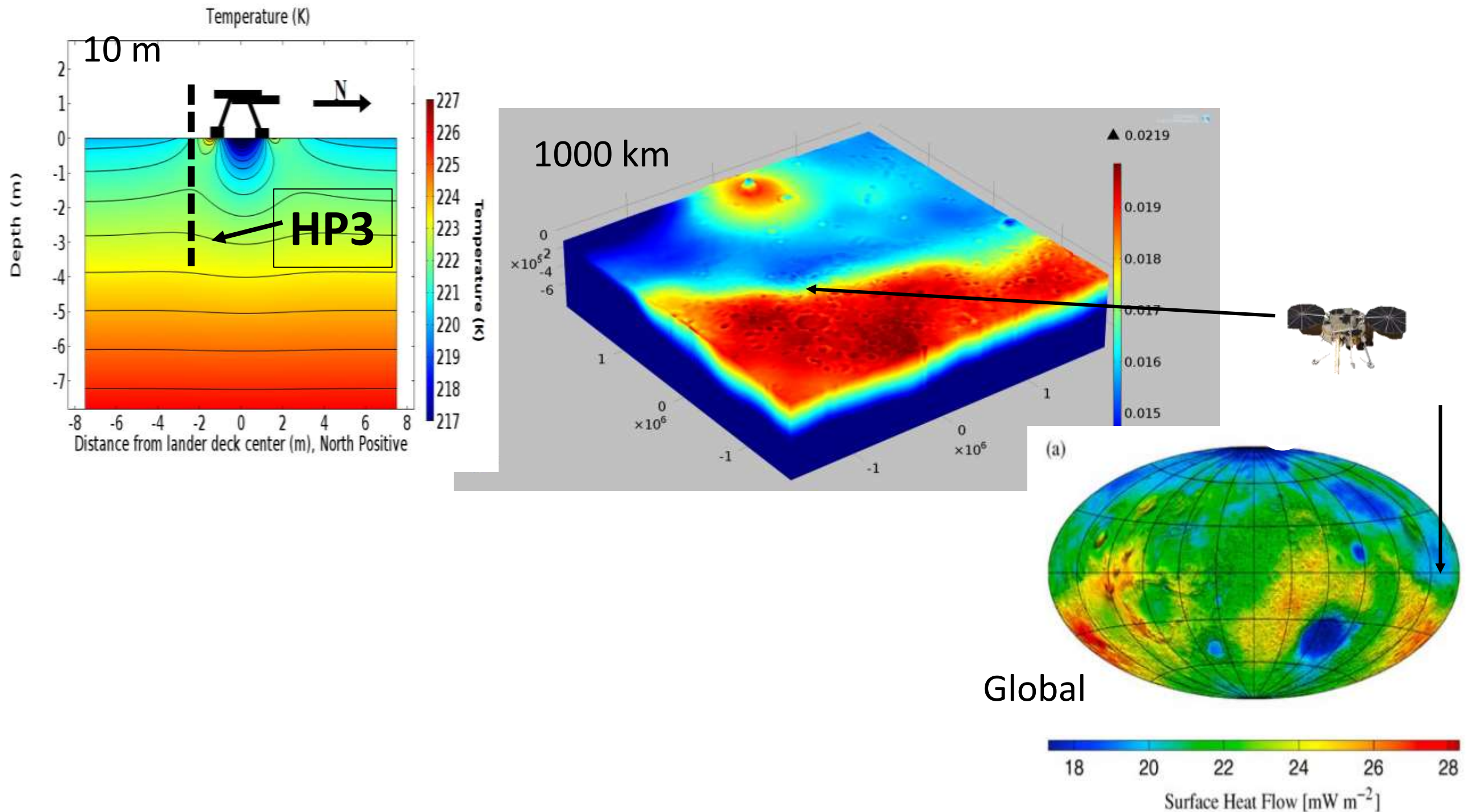
# HP<sup>3</sup> (Heat Flow and Physical Properties Probe)

- HP<sup>3</sup> has a self-penetrating “mole” that burrows down to 5 meters below the surface.
- It trails a tether containing precise temperature sensors every ~35 cm to measure the temperature profile of the subsurface.
- Together with measurements of thermal conductivity, this allows a precise determination of the amount of heat escaping from the planet’s interior.
- Contributed by DLR, the German Space Agency.





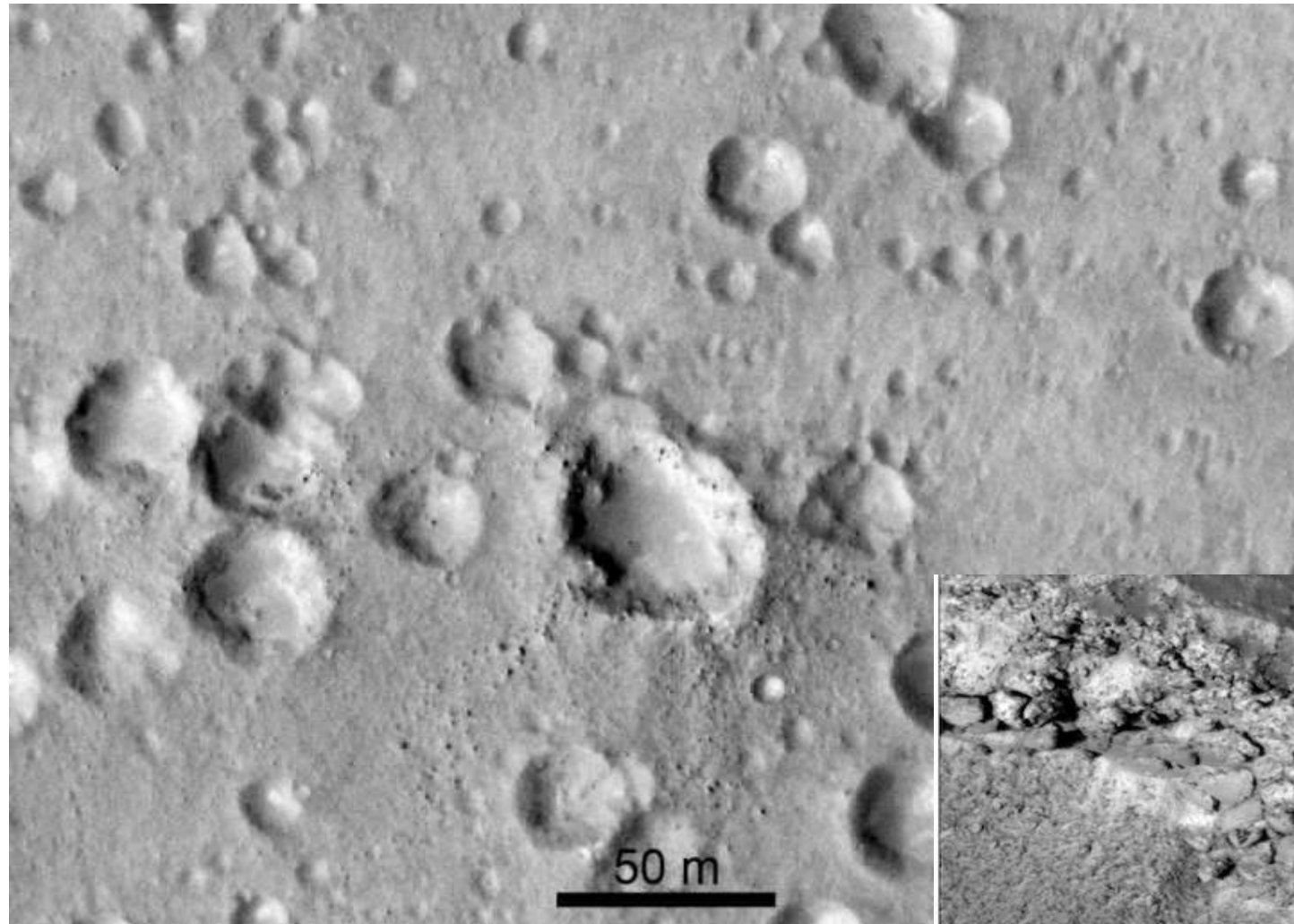
We estimate the effects of features on the scale of meters and kilometers locally and globally on local temperature and heat flow.





# Impact Craters and the InSight Landing Site

- Large craters ( > 50 m) excavate boulders, small craters don't.
- Why do the smaller craters here not excavate large rocks?



Excavation depth = 10% of the crater diameter.

